TRENDS IN BIOTECHNOLOGY

REFERENCE EDITION

Volume 10

1992

CONTENTS

JANUARY/FEBRUARY

Special Issue
Editorial
The genome race is on the road,
by Clare Robinson 1
Genome mapping and sequencing Glossary 4

Priorities and strategies of the HGP
Budgeting the genome,
by Charles R. Cantor 6
Genome sequence analysis: scientific objectives and practical strategies,
by J. Craig Venter, Mark D. Adams, Antonia Martin-Gallardo, W. Richard McCombie and Chris Fields 8
A European 'BRIDGE' project to tackle a model plant genome,
by Etienne Magnien, Michael Bevan and Kees Planqué 12
Sequencing the yeast genome: the European effort,
by Alessio Vassarotti and André Goffeau 15
Model genomes: the benefits of analysing homologous human and mouse sequences,
by Leroy Hood, Ben Koop, Joan Goverman and Tim Hunkapiller 19

Cytogenetics and genome analysis
Using chromosome features in genome mapping,
by Howard Cooke 23
Using fluorescence *in situ* hybridization (FISH) in genome mapping,
by Julie R. Korenberg, Teresa Yang-Feng, Rhona Schreck and Xiao Ning Chen 27

Cloning technologies in genome analysis
Generating 'cloned DNA maps',
by Peter F. R. Little 33
Yeast artificial chromosomes (YACs) and the analysis of complex genomes,
by Rakesh Anand 35
Coincident sequence cloning: a new approach to genome analysis,
by Anthony J. Brookes and David J. Porteous 40
PCR amplification techniques for chromosome walking,
by André Rosenthal 44
Chromosome microtechnology: microdissection and microcloning,
by Karl Otto Greulich 48

Novel sequencing technologies
Semi-automated solid-phase DNA sequencing,
by Mathias Uhlén, Thomas Hultman, Johan Wahlberg, Joakim Lundeberg, Staffan Bergh, Bertil Pettersson, Anders Holmberg, Stefan Ståhl and Tomas Moks 52
Single-molecule detection as an approach to rapid DNA sequencing,
by John D. Harding and Richard A. Keller 55

Computing tools and database design
Data exchange and inter-database communication in genome projects,
by Chris Fields 58
Molecular biological databases – present and future,
by Rainer Fuchs, Peter Rice and Graham N. Cameron 61
An artificial intelligence approach to DNA sequence feature recognition,
by Richard J. Mural, J. Ralph Einstein, Xiaojun Guan, Reinhold C. Mann and Edward C. Uberbacher 66

Resources for genome projects
Nonprofit biological resource centers,
by Denise Casey and Betty K. Mansfield 70

MARCH

Biotopics
Improved selection systems for man-made antibodies,
by Michael J. Geisow 75
The human genome: beyond the bases,
by Michael J. Geisow 77

Forum
Meeting report
Plant molecular biology – moving towards application,
by J-D. Rochaix 78

Focus
Phage antibodies: will new 'coliclonal' antibodies replace monoclonal antibodies?
by David J. Chiswell and John McCafferty 80
Modifying oilseed crops for non-edible products,
by Denis J. Murphy 84

Reviews
Oligonucleotide therapeutics,
by Jack S. Cohen 87
Recombinant haemoglobin in the development of red-blood-cell substitutes,
by Jill E. Ogden 91
Probing identity: the changing face of DNA fingerprinting,
by Paul G. Debenham 96

Book Reviews
Chemical Engineering Problems in Biotechnology (edited by M. A. Winkler),
by Anton Moser 103
Saccharomyces (edited by M. F. Tuite and S. G. Oliver),
by James A. Barnett 103
Bioreaction Engineering Vol. 2: Characteristic Features of Bioreactors (by K. Schügerl),
by A. W. Nienow 104
DNA Fingerprinting: Approaches and Applications (edited by T. Burke, G. Dolf, A. J. Jeffreys and R. Wolff), *by Karen M. Sullivan* 105
Books received 105

APRIL

Biotopics
Aching for approval, hoping for harmony – biotech product regulation,
by Michael J. Geisow 107
What's 'new' in patent law?
by R. Stephen Crespi 108
Bioactive peptides from 'alphabet soup',
by Michael J. Geisow 110

Forum
Meeting report
Antibody engineering – how to be human,
by Charles Cunningham and William J. Harris 112

Feature
Glycoprotein pharmaceuticals: scientific and regulatory considerations, and the US Orphan Drug Act,
by Darrell Teh-Yung Liu 114

Reviews
Recombinant inbred mouse strains: models for disease study,
by Monica J. Justice, Nancy A. Jenkins and Neal G. Copeland 120
Responsive polymer systems for controlled delivery of therapeutics,
by Joseph Kost and Robert Langer 127
Human therapeutics based on triple helix technology,
by James M. Chubb and Michael E. Hogan 132

Book Reviews
Affinity Membranes – Their Chemistry and Performance in Adsorptive Separation Processes (by Elias Klein), *by Ian D. Wilson* 137
Biosynthesis and Biodegradation of Cellulose (edited by Candace H. Haigler and Paul J. Weimer),
by M. P. Coughlan 137
Introduction to Flow Cytometry (by James V. Watson),
by Tore Lindmo 138
Living Resources for Biotechnology – Bacteria (edited by L. R. Hill and B. E. Kirsop),
by A. C. Patterson 139

MAY

Biotopics
Shaping up for a bright future: protein analysis and design,
by Michael J. Geisow 141

Forum
Meeting report
Function and evolution of secondary metabolites – no easy answers,
by Iain S. Hunter 144

Focus
Message Amplification Phenotyping (MAPPing) – principles, practice and potential,
by James W. Larrick 146

Reviews
Antisense oligonucleotides as antiviral agents,
by Sudhir Agrawal 152
Progress in cytokinin research,
by Miroslav Kamínek 159
Genes for jeans: biotechnological advances in cotton,
by Maliyakal E. John and James McD. Stewart 165
Molecular design and catalytic function of a B_{12}-enzyme mimetic,
by Yukito Murakami 170

Book Reviews
Essential Molecular Biology: A Practical Approach, Vol. 1 (edited by T. A. Brown),
by Stephen J. Tucker 178
Macromolecular Structures 1991 (edited by W. A. Hendrickson and K. Wuthrich),
by Michael J. Geisow 178
Enzymes in Biomass Conversion (edited by G. F. Leatham and M. E. Himmel),
by Andrzej Paszczynski and Ronald Crawford 179

JUNE

Biotopics
Inspired respiratory solutions,
by Michael J. Geisow 181

Focus
Databases of complex carbohydrates,
by J. Albert van Kuik and Johannes F. G. Vliegenthart 182

Using RAPD markers for crop improvement,
by Robbie Waugh and Wayne Powell 186

Feature
Biosafety monitoring devices for biotechnology processes,
by Peter Hambleton, Allan M. Bennett, Geoffrey Leaver and John E. Benbough 192

Reviews
The matrix metalloproteinases and their natural inhibitors: prospects for treating degenerative tissue diseases,
by Andrew J. P. Docherty, James O'Connell, Tom Crabbe, Sarojani Angal and Gillian Murphy 200
Biosurfactants: moving towards industrial application,
by Armin Fiechter 208

Book Reviews Supplement
Oligonucleotides and Analogues: A Practical Approach (edited by F. Eckstein),
by Gina Maria Bonara 218
Bioinstrumentation and Biosensors (by Donald L. Wise),
by P. Vadgama 219
Biotechnology in Japan (by Rolf D. Schmid),
by Mark D. Dibner 220
Plant Cell and Tissue Culture (edited by Angela Stafford and Graham Warren),
by Graham Scoles 221
Biotechnology: and the Future of World Agriculture (by Henk Hobbelink),
by Benjamin J. Miflin 221
The Yeasts, Vol. 4, Yeast Organelles (edited by A. H. Rose and J. S. Harrison)
by Stephen G. Oliver 222
Assessing Ecological Risks of Biotechnology (edited by Lev R. Ginzberg),
by Sue Brown 223
Introduction to Protein Structure (by Carl Branden and John Tooze),
by Jim E. Pitts 224
Equitable Patent Protection in the Developing World: Issues and Approaches (by W. Lesser),
by Ana Regina de Holanda Cavalcanti 225
Gene Structure and Expression 2nd edn (by J. D. Hawkins),
by Steve Busby 225
Purification and Analysis of Recombinant Proteins (edited by Ramneth Seetharam and Staish K. Sahrma),
by Christopher Southan 226

Books received 226

JULY

Biotopics
Therapeutic challenges: does Glycobiology have a role?
by Thomas W. Rademacher 227
What's cooking? Optimizing bioprocess monitoring,
by Michael J. Geisow 230

Forum
Workshop
A need to refocus research in the operation of fermenters?
by Patrick N. Royce 232

Focus
Antifungal drug development: the identification of new targets,
by Michael F. Tuite 235

Reviews
The development of a variety- independent gene-transfer method for rice,
by Paul Christou, Tameria L. Ford and Matt Kofron 239
Bacillus subtilis and its relatives: molecular biological and industrial workhorses,
by Colin R. Harwood 247

The microbial production of epoxides,
by David J. Leak, Peter J. Aikens and Mahmoud Seyed-Mahmoudian 256

Book Reviews
Applied Molecular Genetics of Fungi (edited by J. F. Peberdy, C. E. Caten, J. E. Ogden and J. W. Bennett),
by J. R. S. Fincham 262
Mammalian Cell Biotechnology: A Practical Approach (edited by M. Butler),
by Alan Doyle 262
Biodegradation: Natural and Synthetic Materials (edited by W. B. Betts),
by Nigel P. Thurman 263

AUGUST

Biotopics
Codon 65 – unnatural success in protein biosynthesis,
by Michael J. Geisow 265
Progress in engineering HbA – a molecular resuscitator,
by Michael J. Geisow 266

Forum
Meeting Reports
Antibody engineering – how to make useful therapeutics,
by Fabio Malavasi and Alberto Albertini 267
Biopatents: a sense of order,
by Sally I. Hirst 269

Workshops
Untangling biotechnology patents – when is 'obvious' not obvious?
by Anthony Nixon 272
Removal of selectable marker genes from transgenic plants: needless sophistication or social necessity?
by John Bryant and Suzi Leather 274

Reviews
Comparing the glycosylation patterns of recombinant glycoproteins,
by Raj B. Parekh and Thakor P. Patel 276
Strategies for administering targeted therapeutic oligodeoxynucleotides,
by Eric Wickstrom 281
Enzymatic and chemoenzymatic approaches to polymer synthesis,
by Jonathan S. Dordick 287

Book Reviews
Antibody Engineering – A Practical Guide (edited by Carl A. K. Borrebaeck),
by John R. Adair 293
Biosensors (by Frieder Scheller and Florian Schubert),
by Tony Cass 294
Bubble Column Reactors (by W-D. Deckwer),
by José C. Merchuk 294
Bioprocessing (by Owen P. Ward),
by D. E. Brown 295

SEPTEMBER

Biotopics
Are you being served?
by Michael J. Geisow 297
Antibody engineering – successful affinity maturation *in vitro*,
by Michael J. Geisow 299

Forum
Meeting reports
Growth factors in wound healing,
by C. Jane Robinson 301
Using microorganisms for bioremediation: the barriers to implementation,
by Paul Broda 303

Feature
Monoclonal and engineered antibodies for human parenteral clinical use: regulatory considerations,
by Vijaya Manohar and Thomas Hoffman 305

Reviews
Control of *in vivo* proteolysis in the production of recombinant proteins,
by Sven-Olof Enfors 310
Biotechnology of the Archaea,
by Don A. Cowan 315
Genetic engineering of β-lactam antibiotic biosynthetic pathways in filamentous fungi,
by Paul L. Skatrud 324

Book Reviews
Monoclonal Antibody and Immunosensor Technology (by Ailsa M. Campbell),
by Charles Cunningham 330
Molecular Biology and Biotechnology of Extremophiles (edited by R. A. Herbert and R. J. Sharp),
by Charles A. Fewson 330
Biotechnology: Bridging Research and Applications (edited by D. Kamely, A. Chakrabarty and S. Kornynth),
by Julian Burke and Sandy Thomas 331

OCTOBER

Biotopics
Glycoprotein glycans – roles and controls,
by Michael J. Geisow 333
Human serum albumin structure – solved,
by Michael J. Geisow 335

Forum
Workshops
Engineering enzymes for chemoenzymatic synthesis: Part 1: practical routes to aza-sugars and complex carbohydrates,
by Chi-Huey Wong 337
Transgenic wheat plants: the end of the beginning,
by John Bryant 342

Focus
Image analysis: putting filamentous microorganisms in the picture,
by Colin R. Thomas 343

Reviews
Erythropoietin and myeloid colony stimulating factors,
by Graham J. Cowling and T. Michael Dexter 349
Computer-aided drug design: getting the best results,
by J. Scott Dixon 357
Deamidation: a source of microheterogeneity in pharmaceutical proteins,
by Darrell Teh-Yung Liu 364

Book Reviews
Microbes and Man: 3rd edn (by John Postgate),
by W. Allan Hamilton 369
Biotechnological Innovations in Health Care (edited by G. Turnock); and Biotechnological Innovations in Animal Productivity (edited by N. A. A. Macfarlane),
by Raymond Barclay 370

Books received 371

NOVEMBER

Biotopics
Pores for thought in bioseparation and bioassay matrices,
by Michael J. Geisow 373
What's immoral in patent law?
by R. Stephen Crespi 375

Forum
Workshop
Engineering enzymes for chemoenzymatic synthesis: Part 2: modifying proteases for peptide synthesis,
by Chi-Huey Wong 378

Letters
Indiscriminate use of selectable markers – sowing wild oats?
by Jonathan Gressel 382
Reply from Bryant and Leather,
by John Bryant and Suzi Leather 382

Focus
Prospects for engineering virus resistance in plants with antisense RNA,
by Eduardo R. Bejarano and Conrad P. Lichtenstein 383
Malaria transmission-blocking vaccines,
by David C. Kaslow, Ian C. Bathurst and Philip J. Barr 388
Cloned chitinases in fungal plant-pathogen control strategies,
by Amos B. Oppenheim and Ilan Chet 392

Reviews
A perspective on the biotechnological potential of extremophiles,
by Rod A. Herbert 395
Enzymatic synthesis of acrylamide: a success story not over yet,
by Michihiko Kobayashi, Toru Nagasawa and Hideaki Yamada 402

Book Reviews
Directed Mutagenesis: A Practical Approach (edited by M. J. McPherson),
by Phil Nugent 408
The Baculovirus Expression System – A Laboratory Guide (by L. A. King and R. D. Possee),
by Christine J. Watson 409
Monographs on Theoretical and Applied Genetics 14: Genetic Improvement of Tomato (edited by G. Kalloo),
by Ian B. Taylor 410

DECEMBER

Forum
Meeting Report
Genome projects revisited,
by Lennart Philipson 411

Workshop
Progress in developing methylotrophic yeasts as expression systems,
by Gerd Gellissen, Ulrike Weydemann, Alexander W. M. Strasser, Michael Piontek, Zbigniew A. Janowicz and Cornelius P. Hollenberg 413

Letter
Marker gene removal: a practical necessity?
by Andrew Goldsbrough 417

Focus

Bioprocessing of coal-derived synthesis gases by anaerobic bacteria,
by Andrew J. Grethlein and Mahendra K. Jain 418

Cytokine expression by recombinant viruses – a new vaccine strategy,
by Ian A. Ramshaw, Janet Ruby and Alistair Ramsay 424

Reviews

Assaying glycoprotein hormones – the influence of glycosylation on immunoreactivity,
by Patrick L. Storring 427

Mass measurement at high molecular weight – new tools for biotechnologists,
by Michael J. Geisow 432

Designer dyes: 'biomimetic' ligands for the purification of pharmaceutical proteins by affinity chromatography,
by Christopher R. Lowe, Steven J. Burton, Nicolas P. Burton, Wendy K. Alderton, Jennifer M. Pitts and Jannette A. Thomas 442

Book Reviews Supplement

Prospects for Antisense Nucleic Acid Therapy of Cancer and AIDS (edited by E. Wickstrom),
by Jerry W. Slootstra 449

Sequencher™ (a software package for building contigs),
by Nigel K. Spurr and Stephen P. Bryant 450

A Practical Guide to ELISA (by D. M. Kemeny),
by Leif Bülow 450

The Molecular and Cellular Biology of the Yeast *Saccharomyces*, Vol. 1; Genome Dynamics, Protein Synthesis, and Energetics (edited by J. R. Broach, J. R. Pringle and E. W. Jones),
by Alistair J. P. Brown 451

Biodegradable Detergents in the Environment (by William McGucken),
by W. Moerman and W. Verstraete 452

Computer Modeling of Chemical Reactions in Enzymes and Solutions (by Arieh Warshel),
by Hideaki Umeyama 453

Immunochemical Assays and Biosensor Technology for the 1990s (edited by Robert M. Nakamura, Yasushi Kasahara and Garry A. Rechnitz),
by Cornelia Middendorf and Thomas Scheper 453

Soil Biochemistry, Vol. 7 (edited by G. Stotzky and Jean-Marc Bollag),
by Jim A. Harris 454

Biotechnology of Insulin Therapy (edited by John C. Pickup),
by Gillian Danielsen 455

Short Protocols in Molecular Biology, 2nd Edn (edited by F. M. Ausubel, R. Brent, R. E. Kingston, D. D. Moore, J. G. Seidman, J. A. Smith and K. Struhl),
by Karen Sullivan 456

Enzyme Assays – A Practical Approach (edited by Robert Eisenthal and Michael J. Danson),
by Elena Domínquez and Lo Gorton 456

Books received 457

Author index 459

Subject index 462